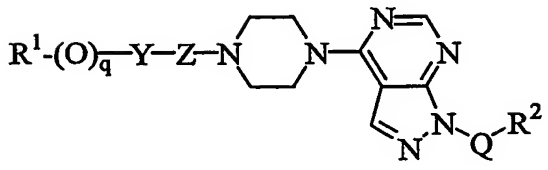
CLAIMS

1. A compound of the formula[I]:



[I]

wherein R^1 is

(A) a substituted aryl group,

(B) an optionally substituted nitrogen-containing aliphatic heteromonocyclic group,

(C) a substituted cyclo-lower alkyl group,

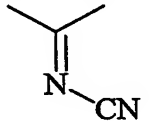
(D) an optionally substituted amino group, or

(E) a substituted heteroaryl group,

R^2 is (a) an optionally substituted heteroaryl group or (b) an optionally substituted aryl group,

Y is a single bond, a lower alkylene group or a lower alkenylene group,

Z is a group of the formula: -CO-, $-CH_2-$, $-SO_2-$ or



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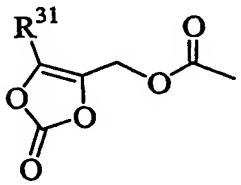
Q is a lower alkylene group, and q is an integer of 0 or 1 or a pharmaceutically acceptable salt thereof.

2. The compound according to Claim 1 in which R^1 is

(A) an aryl group substituted by one to three groups selected from the group consisting of (i) a hydroxyl group; (ii) a halogen atom; (iii) a lower alkyl group; (iv) an amino group optionally substituted by one or two groups selected from a lower alkyl group optionally substituted by a hydroxyl group, a lower alkoxy-lower alkyl group, an amino-lower alkanoyl group optionally substituted by a group selected from a lower alkyl group, a lower alkoxycarbonyl group and a group of the formula:



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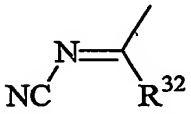
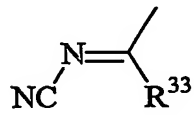
in which R^{31} is a lower alkyl group at the amino moiety, a (mono- or di-lower alkyl)amino-lower alkyl group, a (mono- or di-lower alkyl)carbamoyl group, a lower alkanoyl group optionally substituted by a hydroxyl group, a cyclo-lower alkylcarbonyl group, a lower alkoxy-lower alkanoyl group, a lower alkoxy-lower alkoxycarbonyl group, a cyclo-lower alkyl-lower alkyl group, a lower alkylsulfonyl group, an aryl-lower alkyl group optionally substituted by a (mono- or di-lower alkyl)amino group, a lower alkenoyl group, a thiocarbamoyl group optionally substituted by a lower alkyl group, a heteroarylcarbonyl group, a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkyl group, a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkanoyl group, an arylsulfonyl group optionally substituted by a (mono- or di-lower alkyl)amino group at the aryl moiety; a group of the formula:



in which R^{32} is a lower alkoxy group and a nitrogen-containing aliphatic heteromonocyclic group optionally substituted by a lower alkyl group, (v) a lower alkoxy group optionally substituted by a group selected from an amino group (said amino group being optionally substituted by a group(s) selected from a lower alkyl group and an aryl-lower alkyl group), a heteroaryl group optionally substituted by a lower alkyl group and a nitrogen-containing aliphatic heteromonocyclic group optionally substituted by a lower alkyl group; (vi) an amino-lower alkyl group optionally substituted by a group selected from a lower alkyl group optionally substituted by a hydroxyl group, a lower alkanoyl group, a (mono- or di-lower alkyl)amino-lower alkyl group, a (mono- or di-lower alkyl)amino-lower alkoxycarbonyl group, a lower alkoxy-lower alkanoyl group, a (mono- or di-lower alkyl)carbamoyl group, a lower alkoxy-lower alkoxycarbonyl group, a lower alkoxy-lower alkyl group, a cyclo-lower alkylcarbonyl group, an aryl-lower alkyl group, a cyclo-lower alkyl group, a cyclo-lower alkyl-lower alkyl group, a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkoxycarbonyl group and a group of the formula:



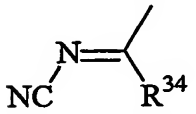
in which R^{33} is an amino group, a (mono- or di-lower alkyl)amino group or a (mono- or di-lower alkyl)amino-lower alkylamino group; (vii) a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkyl group optionally substituted by a group selected from a hydroxyl group, a lower alkyl group optionally substituted by a

hydroxyl group, a lower alkoxy-lower alkyl group and a carbamoyl group; (viii) a carbamoyl group optionally substituted by a group selected from a lower alkyl group, a (mono- or di-lower alkyl)amino-lower alkyl group, a heteroaryl group-substituted lower alkyl group and a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkyl group; (ix) a nitrogen-containing aliphatic heteromonocyclic group optionally substituted by a lower alkyl group (said nitrogen-containing aliphatic heteromonocyclic group may bond to the aryl moiety via an oxygen atom); (x) a nitro group; (xi) a cyclo-lower alkyloxy group optionally substituted by a (mono- or di-lower alkyl)amino group; (xii) a lower alkenyl group optionally substituted by a group selected from a (mono- or di-lower alkyl)amino group and a nitrogen-containing aliphatic heteromonocyclic group; (xiii) a lower alkynyl group optionally substituted by a group(s) selected from a (mono- or di-lower alkyl)amino group and a nitrogen-containing aliphatic heteromonocyclic group; (xiv) a lower alkylthio group optionally substituted by a (mono- or di-lower alkyl)amino group; and (xv) a cyclo-lower alkyl-lower alkoxy group optionally substituted by a (mono- or di-lower alkyl)amino group at the cyclo-lower alkyl moiety,

(B) a nitrogen-containing aliphatic heteromonocyclic group optionally substituted by a group selected from a lower alkyl group, a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkanoyl group, a (mono- or di-lower alkyl)amino-lower alkanoyl group, a lower alkoxy-lower alkyl group, a (mono- or di-lower alkyl)amino-lower alkyl group, a cyclo-lower alkyl group, a heteroaryl group, a nitrogen-containing aliphatic heteromonocyclic group optionally containing one or more double bond in the ring moiety and optionally substituted by a group(s) selected from a lower alkyl group, a lower alkoxy-lower alkyl group, a carbamoyl group and a lower alkanoyl-amino group and an amino group optionally substituted by a group(s) selected from a lower alkyl group, a (mono- or di-lower alkyl)amino group, a cyclo-lower alkyl-carbonyl group, a lower alkenoyl group, a heteroarylcarbonyl group, a lower alkoxy-lower alkyl group, a lower alkanoyl group and a nitrogen-containing aliphatic heteromonocyclic group,

(C) a cyclo-lower alkyl group substituted by a group selected from a group consisting of (i) an amino group optionally substituted by a group selected from a lower alkyl group, a (mono- or di-lower alkyl)amino-lower alkanoyl group, a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkanoyl group, a (mono- or di-lower alkyl)amino-lower alkyl group, a lower alkanoyl group, a cyclo-lower alkylcarbonyl group, a lower alkenoyl group, a heteroarylcarbonyl group, an arylcarbonyl group optionally substituted by a halogen atom(s), a lower alkyl-

thiocarbamoyl group, a lower alkoxycarbonyl group, a cyclo-lower alkyl group, a group of the formula:

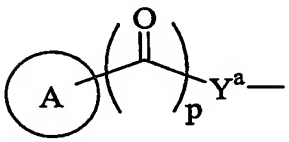


in which R^{34} is a (mono-or di-lower alkyl)amino group, a cyclo-lower alkyl-lower alkyl group and a lower alkylsulfonyl group; (ii) an amino-lower alkyl group optionally substituted by a group selected from a lower alkyl group optionally substituted by a hydroxyl group, a (mono- or di-lower alkyl)amino-lower alkanoyl group, a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkanoyl group, a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkyl group, a (mono- or di-lower alkyl)amino-lower alkyl group, a heteroaryl group-substituted lower alkyl group, a lower alkoxy-lower alkyl group, a lower alkanoyl group, a heteroarylcarbonyl group (the heteroaryl moiety of said group is optionally substituted by a lower alkyl group), a cyclo-lower alkylcarbonyl group, an aryl-lower alkyl group, a cyclo-lower alkyl group, a cyclo-lower alkyl-lower alkyl group, a lower alkylsulfonyl group, a lower alkoxycarbonyl group, a mono- or di-lower alkylcarbamoyl group and an arylcarbonyl group optionally substituted by a group(s) selected from a halogen atom and a lower alkoxy group, a lower alkoxy-lower alkanoyl group and a lower alkanoyl group; (iii) a nitrogen-containing aliphatic heteromonocyclic group optionally substituted by a group(s) selected from a hydroxyl group, a lower alkyl group, a lower alkanoyl group and a lower alkoxy-lower alkyl group; (iv) a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkyl group (said nitrogen-containing aliphatic heteromonocyclic group is optionally fused to a benzene ring and optionally substituted by a group selected from a lower alkyl group, a carbamoyl (or thiocarbamoyl) group, a hydroxyl group, a lower alkoxy-lower alkyl group, a lower alkanoyl group and a (mono- or di-lower alkyl)amino group); (v) a mono- or di-lower alkylamino-lower alkoxy group; and (vi) a carbamoyl group optionally substituted by a group(s) selected from a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkyl group optionally substituted by a lower alkyl group, a (mono- or di-lower alkyl)amino group and a lower alkyl group,

(D) an amino group optionally substituted by a lower alkyl group, or

(E) a heteroaryl group optionally substituted by a group selected from (i) an amino-lower alkyl group optionally substituted by a group(s) selected from a lower alkyl group and a lower alkoxy-lower alkyl group; (ii) an amino group optionally substituted by a group selected from a cyclo-lower alkylcarbonyl group, a (mono- or di-

lower alkyl)amino-lower alkyl group, a lower alkanoyl group, a lower alkenoyl group, a (mono- or di-lower alkyl)thiocarbamoyl group, a (mono- or di-lower alkyl)carbamoyl group and a lower alkyl group; (iii) a carbamoyl group optionally substituted by a group selected from a lower alkyl group, a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkyl group and a (mono- or di-lower alkyl)amino-lower alkyl group; (iv) a lower alkyl group optionally substituted by a halogen atom(s); (v) a (mono- or di-lower alkyl)amino-lower alkoxy group; (vi) an oxo group; and (vii) a group of the following formula:



wherein ring A is a nitrogen-containing aliphatic heteromonocyclic group optionally substituted by a lower alkyl group and optionally fused to a benzene ring, Y^a is a single bond, a lower alkylene group or a lower alkenylene group and p is an integer of 0 or 1, and

R^2 is (a) a heteroaryl group optionally substituted by the same or different one to three groups selected from a lower alkyl group, a lower alkoxy group and a (mono- or di-lower alkyl)amino group or (b) an aryl group optionally substituted by the same or different one to three groups selected from a lower alkyl group, a halogen atom, a halogeno-lower alkoxy group, a (mono- or di-lower alkyl)amino group, a lower alkoxy group, a nitro group, a lower alkoxy-lower alkyl group, a hydroxyl group, a lower alkanoyl group and a lower alkoxycarbonyl group.

3. The compound according to Claim 2 in which the aryl group in R^1 and R^2 is phenyl group or naphthyl group.

4. The compound according to Claim 2 in which the nitrogen-containing aliphatic heteromonocyclic group in R^1 and R^2 is a 4- to 8-membered nitrogen-containing aliphatic heteromonocyclic group.

5. The compound according to Claim 4 in which the nitrogen-containing aliphatic heteromonocyclic group is an azetidinyl group, a pyrrolidinyl group, an imidazolidinyl group, a pyrazolidinyl group, a piperidyl group, a piperazinyl group, an azepinyl group, a diazepinyl group, an azeocinyl group, a diazeocinyl group, a 3-pyrrolinyl group or a morpholinyl group.

6. The compound according to Claim 2 in which the heteroaryl group in R^1 and R^2 is a 5- to 10-membered mono-or bicyclic heteroaryl group.

7. The compound according to Claim 6 in which the heteroaryl group is a nitrogen-containing heteroaryl group selected from a pyrrolyl group, an imidazolyl group, a pyrazolyl group, an oxazolyl group, a thiazolyl group, an isothiazolyl group, an isoxazolyl group, a pyridyl group, a dihydropyridyl group, a pyrazinyl group, a pyrimidinyl group, a tetrahydropyrimidinyl group, a furopyrimidinyl group, a pyridazinyl group, an imidazolidinyl group, an indolyl group, a quinolyl group, an isoquinolyl group, a purinyl group, a 1H-indazolyl group, a quinazolinyl group, a cinnolinyl group, a quinoxalinyl group, a phthalazinyl group and a pteridinyl group or an oxygen- or sulfur-containing heteroaryl group selected from a furyl group, a pyranyl group, a thienyl group, a benzofuryl group and a benzothienyl group.

8. The compound according to one of the Claims 2 to 7 in which Y is a single bond, a lower alkylene group or a lower alkenylene group, Z is -CO- , R^2 is a phenyl group substituted by a group selected from a lower alkoxy group, a lower alkyl group and a halogen atom, a lower alkoxy group-substituted heteroaryl group or a lower alkyl group-substituted heteroaryl group and q is an integer of 0.

9. The compound according to one of Claims 2 to 7 in which Y is a single bond, Z is $-CH_2-$, R^2 is a lower alkoxyphenyl group and q is an integer of 0.

10. The compound according to Claim 8 or 9 in which R^1 is

(a) a phenyl group substituted by a group selected from (i) a lower alkoxy group substituted by a group selected from a (mono- or di-lower alkyl)amino group and a nitrogen-containing aliphatic heteromonocyclic group, (ii) a lower alkyl group substituted by a group selected from a (mono- or di-lower alkyl)amino group and a nitrogen-containing aliphatic heteromonocyclic group, and (iii) an amino group substituted by a group selected from a lower alkyl group, a cyclo-lower alkylcarbonyl group, a (mono- or di-lower alkyl)amino-lower alkyl group, a lower alkoxy-lower alkoxycarbonyl group, a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkyl group, a lower alkanoyl group and a lower alkenoyl group,

(b) a cyclo-lower alkyl group substituted by a group selected from (i) an amino-lower alkyl group optionally substituted by a group(s) selected from a lower alkyl group, a hydroxy-lower alkyl group, a (mono- or di-lower alkyl)amino-lower alkyl) group, a lower alkanoyl group, a cyclo-lower alkylcarbonyl group and a lower alkoxy-lower alkyl group; (ii) a nitrogen-containing aliphatic heteromonocyclic group optionally substituted by a hydroxyl group; and (iii) an amino group substituted by a group selected from a lower alkyl group, a (mono- or di-lower alkyl)amino-lower alkyl group, a lower alkanoyl group, a heteroarylcarbonyl group, a lower alkylsulfonyl group and a lower alkyl-thiocarbamoyl group, or

(c) a nitrogen-containing aliphatic heteromonocyclic group substituted by a group selected from (i) a lower alkyl group, (ii) an amino group optionally substituted by a group selected from a lower alkyl group, a (mono- or di-lower alkyl)amino-lower alkyl group and a cyclo-lower alkylcarbonyl group and (iii) a nitrogen-containing aliphatic heteromonocyclic group substituted by a lower alkyl group, R^2 is a phenyl group substituted by a group selected from a halogen atom and a lower alkoxy group, a lower alkyl-substituted heteroaryl group or a lower alkoxy-substituted heteroaryl group and Q is methylene group.

11. The compound according to Claim 8 in which the group of the formula: R^1-$(O)_q$-Y-Z- is a 4-(mono- or di-lower alkylamino-lower alkyl)benzoyl group; a 4-(pyrrolidino-lower alkyl)benzoyl group; a 4-(di-lower alkylamino-lower alkoxy)-benzoyl group; a 3-(di-lower alkylamino-lower alkoxy)-4-(di-lower alkylamino-lower alkoxy)benzoyl group; a 4-(piperidino-lower alkoxy)benzoyl group; a 4-[N-lower alkyl-N-(di-lower alkylamino-lower alkyl)amino]benzoyl group; a 4-[N-lower alkanoyl-N-(di-lower alkylamino-lower alkyl)amino]benzoyl group; a 4-[N-lower alkenoyl-N-(di-lower alkylamino-lower alkyl)amino]benzoyl group; a 4-[N-(cyclo-lower alkyl-carbonyl)-N-(di-lower alkylamino-lower alkyl)amino]benzoyl group; a 4-[N-(lower alkoxy-lower alkoxycarbonyl)-N-(di-lower alkylamino-lower alkyl)amino]benzoyl group; a 4-[N-lower alkanoyl-N-(pyrrolidino-lower alkyl)amino]benzoyl group; a [1-(lower alkyl)piperidin-4-yl]carbonyl group; a 4-[N-lower alkyl-N-(di-lower alkylamino-lower alkyl)amino]piperidinocarbonyl group; a 4-[N-(cyclo-lower alkylcarbonyl)-N-(di-lower alkylamino-lower alkyl)amino]- piperidinocarbonyl group; a 4-[4-(di-lower alkyl)piperidino]piperidinocarbonyl group; a [1-(lower alkyl)piperidin-4-yl]lower alkanoyl group; a [1-(lower alkyl)piperidin-4-yl]lower alkenoyl group; a 4-(di-lower alkylamino-lower alkyl)cyclohexylcarbonyl group; a 4-(mono- or di-lower alkylamino)-cyclohexylcarbonyl group; a 4-[N-lower alkanoyl-N-(di-lower alkylamino-lower alkyl)amino]cyclohexylcarbonyl group; a 4-[N-lower alkenoyl-N-(di-lower alkylamino-lower alkyl)amino]cyclohexylcarbonyl group; a 4-[N-heteroarylcarbonyl-N-(di-lower alkylamino-lower alkyl)amino]cyclohexyl-carbonyl group; a 4-[N-lower alkylthio-carbamoyl-N-(di-lower alkylamino-lower alkyl)amino]cyclohexylcarbonyl group; a 4-[N-(di-lower alkylamino-lower alkyl)-N-(lower alkylsulfonyl)amino]cyclohexyl-carbonyl group; a 4-[[N-lower alkyl-N-(hydroxy-lower alkyl)amino]lower alkyl]-cyclohexylcarbonyl group; a 4-[[N-lower alkyl-N-(lower alkoxy-lower alkyl)amino]-lower alkyl]cyclohexylcarbonyl group; a 4-[[N-lower alkanoyl-N-(di-lower alkylamino-lower alkyl)amino]lower alkyl]cyclohexylcarbonyl group; a 4-[[N-(cyclo-lower alkylcarbonyl)-N-(di-lower alkylamino-lower alkyl)amino]lower alkyl]cyclohexyl-carbonyl group; a 4-(pyrrolidino)cyclohexylcarbonyl group; a 4-(hydroxypyrrolidino)-cyclohexylcarbonyl group; or a 4-(piperidino)cyclohexylcarbonyl group, and R^2 is a phenyl group substituted by one or two groups selected from an ethoxy group and a fluorine atom, an ethoxypyridyl group, a propylpyridyl group or a propylthiazolyl group.

12. The compound according to Claim 10 or 11 in which R^2 is 3-ethoxyphenyl group, 6-propylpyridin-2-yl group, 6-ethoxypyridin-2-yl group, 2-propyl-

1,3-thiazol-4-yl group or 3-ethoxy-2-fluorophenyl group.

13. A compound which is

1-(3-ethoxybenzyl)-4-[4-[4-[2-(dimethylamino)ethoxy]benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[4-[2-(1-piperidyl)ethoxy]benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[4-(dimethylaminomethyl)benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[4-(diethylaminomethyl)benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[4-(1-pyrrolidinylmethyl)benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[4-[N-(cyclopropylcarbonyl)-N-[2-(dimethylamino)ethyl]-amino]benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[4-[N-[(2-methoxyethoxy)carbonyl]-N-[2-(dimethylamino)-ethyl]amino]benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[4-[N-isobutyl-N-[2-(dimethylamino)ethyl]amino]benzoyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[(1-propylpiperidin-4-yl)carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[3-(1-isopropylpiperidin-4-yl)propionyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[[trans-4-(dimethylaminomethyl)cyclohexyl]carbonyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[[trans-4-(1-pyrrolidinyl)cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[(E)-3-(1-isopropylpiperidin-4-yl)acryloyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[4-[3-(dimethylamino)-2,2-dimethylpropyloxy]benzoyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-[(6-propylpyridin-2-yl)methyl]-4-[4-[4-[3-(dimethylamino)-2,2-dimethylpropyloxy]-benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[4-[N-acetyl-N-[2-(1-pyrrolidinyl)ethyl]amino]benzoyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

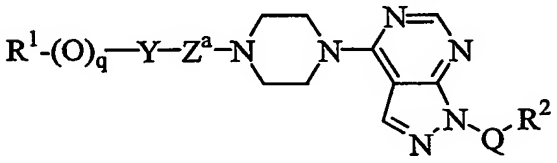
1-(3-ethoxybenzyl)-4-[4-[4-[N-acetyl-N-[2-(dimethylamino)ethyl]amino]benzoyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[4-(ethylaminomethyl)benzoyl]piperazin-1-yl]-1H-pyrazolo-[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[(trans-4-piperidinocyclohexyl)carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[[trans-4-((3S)-3-hydroxy-1-pyrrolidinyl)cyclohexyl]-carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[[trans-4-[N-acetyl-N-[2-(dimethylamino)ethyl]amino]-cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[[trans-4-[N-(2-furoyl)-N-[2-(dimethylamino)ethyl]amino]-cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[[trans-4-[N-(crotonoyl)-N-[2-(dimethylamino)ethyl]amino]-cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[[trans-4-[N-(methylthiocarbamoyl)-N-[2-(dimethylamino)-ethyl]amino]cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(2-propyl-1,3-thiazol-4-yl)methyl]-4-[4-[4-[N-crotonoyl-N-[2-(dimethylamino)-ethyl]amino]-benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(6-ethoxypyridin-2-yl)methyl]-4-[4-[[trans-4-(1-pyrrolidinyl)cyclohexyl]carbonyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(6-propylpyridin-2-yl)methyl]-4-[4-[[trans-4-(1-pyrrolidinyl)cyclohexyl]carbonyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(6-propylpyridin-2-yl)methyl]-4-[4-[[trans-4-(diethylaminomethyl)cyclohexyl]-carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(6-propylpyridin-2-yl)methyl]-4-[4-[[trans-4-[N-isopropyl-N-(2-methoxyethyl)-aminomethyl]cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(2-propyl-1,3-thiazol-4-yl)methyl]-4-[4-[4-[2,2-dimethyl-3-(dimethylamino)propyl-oxy]benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(6-propylpyridin-2-yl)methyl]-4-[4-[[trans-4-(dipropylamino)cyclohexyl]carbonyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(2-propyl-1,3-thiazol-4-yl)methyl]-4-[4-[[trans-4-(dipropylamino)cyclohexyl]-carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(6-propylpyridin-2-yl)methyl]-4-[4-[[trans-4-(1-piperidyl)cyclohexyl]carbonyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(6-ethoxypyridin-2-yl)methyl]-4-[4-[[trans-4-(1-piperidyl)cyclohexyl]carbonyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(2-propyl-1,3-thiazol-4-yl)methyl]-4-[4-[[trans-4-(1-piperidyl)cyclohexyl]-carbonyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;

1-(3-ethoxybenzyl)-4-[4-[[trans-4-(ethylamino)cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[3-[2-(diisopropylamino)ethoxy]-4-[3-(dimethylamino)-2,2-(dimethyl)propyloxy]benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[4-[N-(cyclopropanecarbonyl)-N-[2-(dimethylamino)ethyl]-amino]piperidinocarbonyl]piperazin-1-yl]-1H- pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[4-(3,3-dimethylpiperadino)piperidinocarbonyl]piperazin-1-yl]-1H- pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[4-[N-ethyl-N-[2-(dimethylamino)ethyl]amino]piperidino-carbonyl]piperazin-1-yl]-1H- pyrazolo[3,4-d]pyrimidine;
1-[(6-propylpyridin-2-yl)methyl]-4-[4-[[trans-4-[[N-(t-butyl)-N-ethylamino]methyl]-cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(6-propylpyridin-2-yl)methyl]-4-[4-[[trans-4-[[N-(t-butyl)-N-[2-(methoxy)ethyl]-amino]methyl]cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(6-ethoxypyridin-2-yl)methyl]-4-[4-[[trans-4-[[N-(t-butyl)-N-[2-(methoxy)ethyl]-amino]methyl]cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[[trans-4-[[N-(t-butyl)-N-[2-(methoxy)ethyl]amino]methyl]-cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(2-propyl-1,3-thiazol-4-yl)methyl]-4-[4-[[trans-4-[[N-(t-butyl)-N-[2-(methoxy)-ethyl]amino]methyl]cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]-pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[[trans-4-[[N-(t-butyl)-N-[2-(hydroxy)ethyl]amino]methyl]-cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(6-propylpyridin-2-yl)methyl]-4-[4-[[trans-4-[N-[2-(dimethylamino)ethyl]-N-(methanesulfonyl)amino]cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-[(6-ethoxypyridin-2-yl)methyl]-4-[4-[[trans-4-[N-[2-(dimethylamino)ethyl]-N-(methanesulfonyl)amino]cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]-pyrimidine;
1-[(2-propyl-1,3-thiazol-4-yl)methyl]-4-[4-[[trans-4-[N-[2-(dimethylamino)ethyl]-N-(methanesulfonyl)amino]cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]-pyrimidine;
1-[(6-propylpyridin-2-yl)methyl]-4-[4-[[trans-4-[[N-[2-(dimethylamino)ethyl]-N-pivaloylamino]methyl]cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]-pyrimidine;
1-[(6-propylpyridin-2-yl)methyl]-4-[4-[[trans-4-[[N-(cyclopropanecarbonyl)-N-[2-

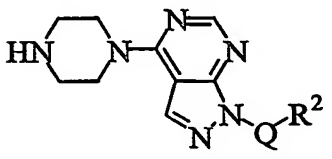
(dimethylamino)ethyl]amino]methyl]cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxybenzyl)-4-[4-[[trans-4-[N-[2-(dimethylamino)ethyl]-N-propionylamino]-cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxy-2-fluorobenzyl)-4-[4-[(trans-4-piperidin-1-ylcyclohexyl)carbonyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxy-2-fluorobenzyl)-4-[4-[[trans-4-[[N-(t-butyl)-N-[2-(methoxy)ethyl]amino]-methyl]cyclohexyl]carbonyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxy-2-fluorobenzyl)-4-[4-[4-(ethylaminomethyl)benzoyl]piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
1-(3-ethoxy-2-fluorobenzyl)-4-[4-[4-[N-acetyl-N-[2-(dimethylamino)ethyl]amino]-benzoyl]-piperazin-1-yl]-1H-pyrazolo[3,4-d]pyrimidine;
or a pharmaceutically acceptable salt thereof.

14. A method for preparing a compound of the following formula [I-A]:



[I-A]

wherein R^1 is
(A) a substituted aryl group,
(B) an optionally substituted nitrogen-containing aliphatic heteromonocyclic group,
(C) a substituted cyclo-lower alkyl group,
(D) an optionally substituted amino group, or
(E) a substituted heteroaryl group,
R^2 is (a) an optionally substituted heteroaryl group or (b) an optionally substituted aryl group,
Y is a single bond, a lower alkylene group or a lower alkenylene group,
Z^a is a group of the formula: -CO-, $-SO_2-$ or =C=N-CN,
Q is a lower alkylene group, and q is an integer of 0 or 1, which comprises reacting a compound of the formula [II]:



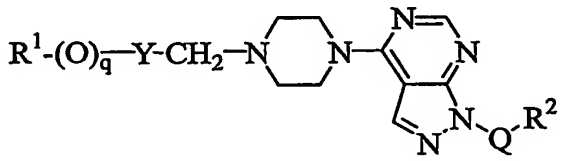
[II]

wherein the symbols are the same as defined above or a salt thereof with a compound of the formula [III]:

R^1-$(O)_q$-Y-Z^a-OR^3 [III]

wherein R^3 is a hydrogen atom, a lower alkyl group or a benzyl group and other symbols are the same as defined above or a salt thereof.

15. A method for preparing a compound of the formula [I-B]:



[I-B]

wherein R^1 is

(A) a substituted aryl group,

(B) an optionally substituted nitrogen-containing aliphatic heteromonocyclic group,

(C) a substituted cyclo-lower alkyl group,

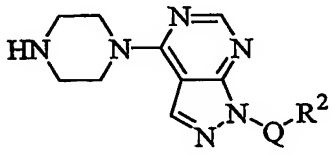
(D) an optionally substituted amino group, or

(E) a substituted heteroaryl group,

R^2 is (a) an optionally substituted heteroaryl group or (b) an optionally substituted aryl group,

Y is a single bond, a lower alkylene group or a lower alkenylene group,

Q is a lower alkylene group, and q is an integer of 0 or 1, which comprises reacting a compound of the formula [II]:



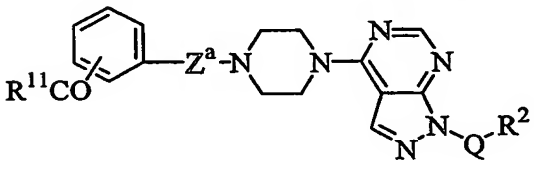
[II]

wherein the symbols are the same as defined above or a salt thereof with an aldehyde compound of the formula [IV]:

R^1-$(O)_q$-Y-CHO [IV]

wherein the symbols are the same as defined above.

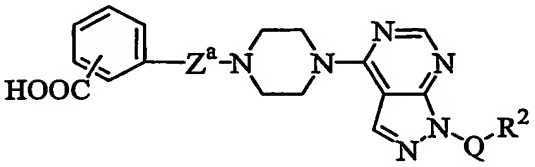
16. A method for preparing a compound of the formula [I-C]:



[I-C]

wherein R^{11} is an amino group optionally substituted by a group selected from a lower alkyl group, a (mono- or di-lower alkyl)amino-lower alkyl group and a nitrogen-containing aliphatic heteromonocyclic group-substituted lower alkyl group, Z^a is a group of the formula: -CO-, -SO_2- or =C=N-CN, R^2 is (a) an optionally substituted

heteroaryl group or (b) an optionally substituted aryl group, and Q is a lower alkylene group, which comprises reacting a carboxylic acid compound of the formula [V]:



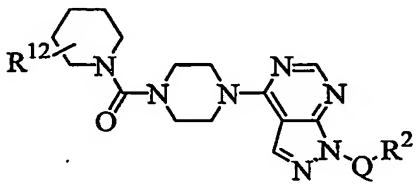
[V]

wherein the symbols are the same as defined above or a salt thereof with a compound of the formula [VI]:

R^{11}-H [VI]

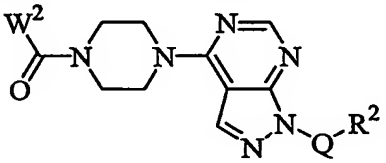
wherein R^{11} is the same as defined above or a salt thereof.

17. A method for preparing a compound of the formula [I-D]:



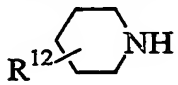
[I-D]

wherein R^{12} is an optionally substituted nitrogen-containing aliphatic heteromonocyclic group or an optionally substituted amino group, R^2 is (a) an optionally substituted heteroaryl group or (b) an optionally substituted aryl group, and Q is a lower alkylene group, which comprises reacting a compound of the formula [VII]:



[VII]

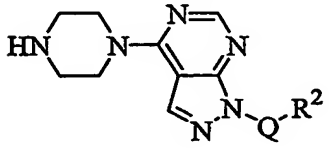
wherein W^2 is a reactive residue and other symbols are the same as defined above with a compound of the formula [VIII]:



[VIII]

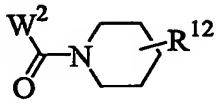
wherein the symbol is the same as defined above or a salt thereof, or

reacting a compound of the formula [II]:



[II]

wherein the symbols are the same as defined above or a salt thereof with a compound of the formula [IX]:



[IX]

wherein the symbol is the same as defined above.

18. A pharmaceutical composition which comprises as an active ingredient a compound claimed in any one of the Claims 1 to 13 or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier therefor.

19. A method for prophylaxis and/or treatment of small conductance potassium channel (SK channel)-related diseases which comprises administering a compound claimed in any one of Claims 1 to 13 or a pharmaceutically acceptable salt thereof to a subject in need of the prophylaxis and/or treatment of such diseases.

20. The method according to Claim 19, in which the SK channel-related disease is one selected from gastrointestinal motility disorders, central nervous system disorders, emotional disorders, myotonic muscular dystrophy and sleep apnea.

21. The method according to Claim 20, in which the gastrointestinal motility disorder is constipation, irritable bowel syndrome, gastoroesophageal reflux disease, or post operative ileus.

22. The method according to Claim 20, in which the central nervous system disorders is memory and learning disorders including Arzheimer's disease or depression.